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INFORMATION INTEGRATION IN RATINGS OF JOB SATISFACTION AND WORK EFFORT

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BASIC RESEARCH

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Job satisfaction and work motivation were studied using experimental methods from information integration theory and functional measurement. Subjects rated the levels of satisfaction and work effort appropriate to each of a number of job descriptions, which varied in starting salary, time requirement, (hours per week), amount of potential pay increase, time to pay increase, and performance requirement for pay increase. Each subject rated all jobs in a replicated factorial combination of these variables. Data from this research were shown useful for (1) evaluating quantitative descriptions of (Continued)

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work-related behavior at both group and individual levels, (2) predicting the effects of changes in job variables, and (3) equating monetary and nonmonetary job factors for their effects on rated satisfaction and work effort. Starting salary and time requirement accounted for most of the variance in rated satisfaction, while all individual variables accounted for some variance in rated work effort.

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Personnel Accession and Retention

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FOREWORD

Effective management of personnel retention requires understanding of the factors that play a role in determining whether a soldier stays in the Army or leaves. It is essential to be able to measure the contributions of each of the complex of factors that make up the alternative Army and civilian life styles and careers.

The present research demonstrates that information integration theory and the method of functional measurement provide a way to assess the contribution of individual job factors to overall work effort and job satisfaction. The method will be used in subsequent research on personnel retention and reenlistment decision making.

This research was done in response to requirements of Army Project 2T161101A791B.

EDGAR M. JOHNSON
Technical Director

INFORMATION INTEGRATION IN RATINGS OF JOB SATISFACTION AND WORK EFFORT

EXECUTIVE SUMMARY

Requirements:

In making judgments and choices about jobs and careers, soldiers evaluate complete jobs. It is important, however, to be able to assess the relative contribution of each job factor to the overall judgment. A method for doing this is necessary for research in reenlistment decision making.

Procedures:

Psychologists rated jobs that varied along several dimensions. Analysis of variance and regression analyses were used to evaluate the relative contribution of each factor to overall ratings.

Results:

The method proved valuable in analyzing job ratings.

Utilization of Findings:

Results of this research will be used in planning and designing future research in reenlistment decision making.

INFORMATION INTEGRATION IN RATINGS OF JOB SATISFACTION AND WORK EFFORT

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INTRODUCTION

The main purpose of this report is to describe some characteristics of a method for studying the way people integrate information in making judgments about jobs. The method was developed for future use in studying the ways people make vocational decisions, but it has wider application to the study of all job-related judgments and decisions.

The method used here is an adaptation of information integration and functional measurement theory (Anderson, 1977, 1978, 1979). The method has three benefits. First, it has potential as a tool for evaluating quantitative descriptions of job-related behavior such as those derived from learning and motivation theory. Second, the results can be used to predict the effects of changes in one or more job factors. Third, certain experimental outcomes make it possible to assign dollar values to nonmonetary job factors, that is, to scale the value of nonmonetary job factors in monetary terms.

Evaluating Quantitative Descriptions of Job-Related Behavior

A number of quantitative and semiquantitative theories of job-related behavior have been formulated in economic utility theory, motivation theory, and the psychology of learning. These theories have not been adequately tested because of flaws in the measurement methods and research designs used (Campbell & Pritchard, 1976; Schmidt, 1973). In general, quantitative and quasi-quantitative descriptions of work-related behavior have been tested using correlational research designs patterned after successful psychometric practice in mental testing. These methods are not appropriate for evaluating quantitative models of job-related behavior (see Campbell & Pritchard, 1976, and references cited therein for discussions on this point). Information integration theory and functional measurement offer solutions to many of the methodological problems in earlier work.

Results from a very extensive program of research on information integration show that people integrate information in a number of psychophysical and judgment tasks according to relatively simple algebraic rules (Anderson, 1979) or models: the additive model, the multiplicative model, and the averaging model. Each of these algebraic models, along with compounds of the simple models, has distinct implications for the pattern of results from factorial and modified factorial experimental designs, thus making it possible to identify each model from a specific pattern of experimental results. Some of these implications will be discussed later. Anderson (1977, 1978, 1979, and references therein) provides more detail for the interested reader. Since adding, multiplying, and averaging models have all appeared in descriptions of information integration for job satisfaction, job choice, and work motivation, the experimental designs for distinguishing between competing formulations need to be identified and developed.

The basic idea of functional measurement is that experimental support for a simple information integration model also provides evidence that the experimental procedure has produced interval scales of measurement for the subjective variables involved. Empirical results suggest that scaling based on rating procedures produces such interval scales of measurement. Thus, functional measurement theory may provide tools to solve some of the measurement problems associated with variables studied in research on the psychology of work.

Predicting the Effects of Changes in Job Factors

It was pointed out earlier that correlational research designs are not usually appropriate for evaluating mathematical descriptions of job-related behavior. Such designs are also not appropriate for predicting the effects of changes in job factors on subsequent behavior (Campbell & Pritchard, 1976). The within-subject experimental designs used in studying information integration do provide a suitable basis for making predictions about the effects of changes in one or more of the factors involved. These experimental designs fall into what Hays (1973) calls regression designs (see Hays, 1973, chap. 15 for the distinction between correlational and regression research designs).

Assigning Monetary Values to Nonmonetary Job Factors

Galanter (1975; Galanter & Pliner, 1974) has suggested monetary value as a basis for the measurement of utility. Such a suggestion has a great deal of appeal in the study of job factors. If monetary and nonmonetary job factors can be equated for importance, utility, or other variables, managers can make more rational decisions about the cost effectiveness of changes in work organization (e.g., whether pay should be increased or the same money should be invested in changing supervisory practices or redesigning the workplace). The experimental procedure used here offers a procedure for monetizing job factors that is somewhat different from Galanter's (1975).

To accomplish the three objectives described earlier, subjects were asked to rate descriptions of jobs for satisfaction and anticipated work effort. The jobs described varied in starting salary, hours per week required, amount of potential salary increase, time until salary increase, and performance requirement for salary increase. Each subject rated all jobs in a factorial combination of these variables.

METHOD

Subjects

Seven research psychologists participated in the present research. Four of the participants were women, and three were men. All participants held advanced degrees in psychology, five at the doctoral level and two at the master's level. All were adults whose ages ranged from the mid-twenties to mid-fifties. All were employed by a government research organization and actively involved in research in military psychology.

Subjects volunteered for the research by signing an interoffice memo that briefly described the project and requested participation. The apparent motivation for participation was either curiosity or the understanding that the author would reciprocate by participating in similar pilot research conducted by the participants.

Materials

Stimuli for the experiments were descriptions of jobs. Stimuli were presented to each participant in the form of a booklet with one job description per page. Each booklet contained 216 experimental stimuli, three practice stimuli, and a page of instructions, for a total of 220 pages.

Each job description was followed on the same page by two horizontal graphic rating scales, the satisfaction scale and the effort scale. The satisfaction scale was 150 mm long and anchored with the words "completely dissatisfied" and "completely satisfied" at the left and right extremes, respectively. The effort scale was 100 mm long and anchored with the phrases "0% effort" and "100% effort" at the left and right extremes, respectively. Job satisfaction and rated work effort were selected as the dependent variables because both have been studied extensively in research on work motivation (Campbell & Pritchard, 1976; Lawler, 1973). An example of a job description and the rating scales is shown in Figure 1.

Job descriptions contained information about the following job factors: job title, job task content, hours per week required, starting salary, amount of potential pay increase, and performance requirement for pay increase. Job title and job task content were the same for all jobs. The job title was "Research Psychologist." Task content was described in terms of the percentage of the job devoted to research and administrative tasks: 80% research and 20% administrative.

Once job factors and dependent variables were selected, values for the former were chosen that covered a substantial range but were realistic for research psychologists employed by the U.S. government. The number of values for each variable was selected to adequately cover the range while filling a factorial design of manageable proportions. Job descriptions were constructed to include two replications of all possible combinations of the variables and their values, shown in Table 1.

Since jobs are highly multidimensional, the job factors used as variables in the present experiment were selected from a much longer list of job factors because they were relatively easy to quantify and because they were analogous to variables included in economic (Lea, 1978) or psychological (Campbell & Pritchard, 1976) accounts of motivation and performance.

The job descriptions filled the following experimental design: Starting Salary (SS) × Time Requirement (TR) × Potential Salary Increase (SI) × Time to Salary Increase (TI) × Performance Requirement (PR) × Replications, a six-way factorial design with $3 \times 3 \times 2 \times 3 \times 2 \times 2 = 216$ individual stimuli. All participants responded to all stimuli, so that all factors were within-subject factors. With seven subjects, there were $7 \times 216 = 1{,}512$ data points for each of the two dependent variables, job satisfaction and work effort.

JOB DESCRIPTION NUMBER

Job Title: Research Psychologist

Task Mix: 80% Research
20% Administration

Time Requirement: 60 hours/week

Starting Salary: $20,467

You are certain to get a step increase of $682 (no more, no less) after 10 months on the job (no sooner) only if your work is usually very good.

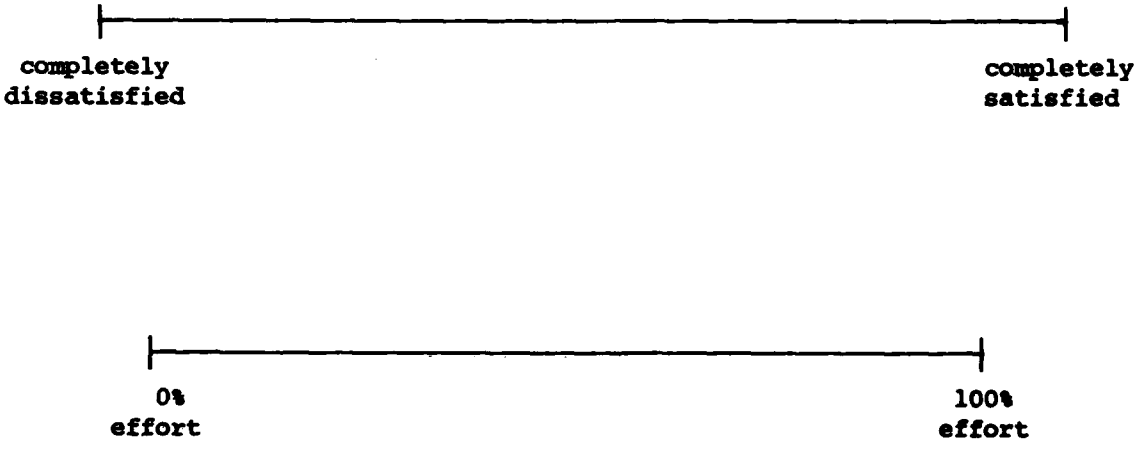

Figure 1. Sample job description from the booklet of stimulus materials used in the experiment.

Table 1

Values of Job Factors Included in the Experiment

Job factor	Range described to subject	Actual values included in job descriptions
Starting Salary	$20,000/yr. to $60,000/yr.	$20,467/yr. $32,048/yr. $44,547/yr.
Time Requirement	10 hrs./wk. to 70 hrs./wk.	20 hrs./wk. 40 hrs./wk. 60 hrs./wk.
Salary Increase (potential)	$500/yr. to $7,000/yr.	$682/yr. $5,097/yr.
Time to Salary Increase	6 months to 48 months	8 months 17 months 37 months
Performance Requirement	yes no	yes no

Procedure

Participants responded to the booklet of job descriptions individually. Each participant received one booklet of stimulus materials and made responses directly in the booklet. Job descriptions were arranged in a different random order for each subject.

In a quiet room the participant was seated at a table across from the experimenter. The experimenter handed the stimulus booklet to the subject and asked the subject to read along while the experimenter read the instructions aloud. In reading the instructions, the experimenter told the participant that the stimulus booklet contained job descriptions. The participant was instructed to read each job description and imagine that he or she had just accepted the job described. On this premise, the subject was instructed to rate the level of satisfaction that he or she would feel in the job described and the level of effort he or she would give to the job. The experimenter asked the subject to rate each job description separately and to use all and only the information provided in the instructions and the individual job descriptions. The experimenter then provided the subject with a separate sheet that listed the job factors and a range of values within which each experimental stimulus fell. The range was slightly greater than the actual range of stimuli used. Ranges for each factor are included in Table 1.

The experimenter asked the subject to read the first practice job description and respond to it. After the first practice stimulus, the experimenter corrected the subject when necessary and gave the subject an opportunity

to ask questions. The experimenter answered any questions, using paraphrases of the written instructions whenever possible. Then the subject was asked to complete the next two practice stimuli. After the subject successfully completed all practice jobs and indicated that there were no further questions, the experimenter instructed the subject to begin working on the actual experimental stimuli, to respond to each stimulus in the sequence presented, and not to go back to previously completed stimuli.

For each stimulus job description, the subject rated satisfaction and level of effort by making a short vertical mark across the horizontal line of the graphic rating scale.

Subjects' ratings were hand-scored using a metric ruler to measure the distance from the low end of the graphic rating scale to the point marked on the scale by the subject. Scores were recorded to the nearest 0.1 mm directly on data coding sheets for subsequent key punching and statistical analysis.

Data Analysis

Data from the satisfaction and effort ratings were analyzed separately except for correlations showing the relationship between the two measures. The same analyses were performed for satisfaction and effort data. The statistical analyses were as follows: (1) Reliability of ratings for each of the seven subjects was examined by correlating ratings for the first and second replicate of each job description. (Separate correlations were computed for the satisfaction and effort ratings.) (2) Correlational analysis was used to determine the degree of relationship between satisfaction and effort ratings. (3) An overall six-way analysis of variance (ANOVA) was done for the satisfaction and effort ratings. (4) A hierarchical regression analysis was done on the satisfaction and effort data. (5) Five-way ANOVAs were conducted on the satisfaction and effort data for each individual subject. (6) Hierarchical regression analyses were performed on the satisfaction and effort data for each individual subject.

The ANOVAs were conducted using the BMDP Biomedical Computer Programs program 2v (Dixon & Brown, 1979). The regression and correlational analyses were done using the Statistical Package for the Social Sciences (SPSS) (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975).

The overall six-way and the individual five-way ANOVAs were used, as described in Anderson (1977), to evaluate the information integration processes underlying the ratings. The rationale for this analysis is contained in the parallelism theorem and the linear fan theorem from information integration theory and functional measurement. These two theorems are based on the idea that a person's response in an information integration task is the result of three cascaded functions, the valuation function, the integration function, and the response function. The valuation function transforms the value of a physical stimulus into its subjective counterpart. The integration function transforms two or more subjective stimulus values into an implicit response. The response function transforms the implicit response into an overt psychomotor response. The parallelism and linear fan theorems are based on assumptions about the integration function and the response function (Anderson, 1977, 1978).

The parallelism theorem states that (1) if two stimulus variables are integrated according to an additive rule, (2) if the observable rating response is a linear function of the implicit response, and (3) if the stimulus variables have independent effects, then (1) the data from a factorial design will plot as a set of parallel lines, (2) the interaction terms in an ANOVA will be zero in theory and nonsignificant in practice, and (3) the marginal means of the data table will be measures of the subjective stimuli on a validated interval scale.

The linear fan theorem states that (1) if two stimulus variables are integrated according to a multiplying rule, (2) if the observable rating response is a linear function of the implicit response, and (3) if the stimulus variables have independent effects, then (1) the appropriate plot of the data from a factorial design will form a set of diverging straight lines, (2) the appropriate interaction term in an ANOVA will be significant, and (3) the marginal means of the data table will be values of the subjective stimuli on a validated interval scale, that is, they will be linear functions of the subjective stimulus values.

These two theorems are the basis for the interpretation of data from information integration experiments with two or more factors. Results from the present research were examined using ANOVA and graphical analysis to examine the pattern of significant and nonsignificant interactions and to make preliminary statements about the information integration processes used by the subjects in completing the experimental task. Both overall and individual ANOVAs were performed to examine the possibility of individual differences in the information integration processes.

There were three rationales for the regression analyses. First, regression analysis provides a supplement to ANOVA for partitioning total experimental variance into within-subject variance and between-subject variance, and it provides statistics that can be interpreted as measures of the proportion of variance accounted for by each independent variable (Cohen & Cohen, 1975). Second, the obtained regression equation can be used as a basis for predicting the effects of changes in one or more of the independent variables on subsequent ratings. Third, a simple linear regression can be used to accomplish the monetization described in the introduction by equating changes in the dependent variable due to changes in monetary incentives with changes in the dependent variable due to nonmonetary job factors.

RESULTS

Correlational Analyses

Correlations between replications are presented for each subject in Table 2. Correlations were higher for the satisfaction ratings than for the effort ratings. Median correlations were $\underline{r} = .87$ and $\underline{r} = .72$ for the satisfaction and effort ratings, respectively.

Correlations between the satisfaction and effort ratings for each subject and for all subjects are presented in Table 2. The overall correlation was .76.

Table 2

Results of Correlational Analyses

Subject	Reliability of satisfaction rating	Reliability of effort rating	Correlation of satisfaction and effort ratings
1	.88	.76	.72
2	.82	.77	.74
3	.87	.72	.76
4	.89	.70	.81
5	.92	.64	.63
6	.66	.66	.87
7	.85	.79	.83
Median	.87	.72	.76

Overall Analysis of Variance

Partial results of the ANOVAs for satisfaction and effort data, for all subjects, are presented in Tables 3 and 4. Because there were 63 variables in each ANOVA, only the variables that met the criterion for further consideration are presented. Since this research was exploratory, effects were regarded as statistically significant if $p \leq .01$, even though a large number of significance tests were performed. Effects were regarded as worth further study if they satisfied either of two criteria: if they were statistically significant or if they accounted for more than 1% of the total variance according to the regression analyses.

Table 3

Overall ANOVA Results for Satisfaction Data: Partial Table Showing Results That Were Statistically Significant

Factor	df	F	p
Salary Increase	1/6	16.3	0.007
Time to Increase	2/12	25.1	0.000
Starting Salary	2/12	77.1	0.000
Time Requirement	2/12	38.7	0.000

In the overall ANOVA of the satisfaction data, the main effects due to Salary Increase, Time to Increase, Starting Salary, and Time Requirement were statistically significant. None of the interaction terms was significant.

Table 4

Overall ANOVA Results for Effort Data: Partial Table Showing Effects That Were Statistically Significant

Factor	df	F	p
Salary Increase	1/6	20.9	0.004
Time to Increase	2/12	15.6	0.000
Starting Salary	2/12	74.3	0.000
Time Requirement	2/12	48.5	0.000
SS × TR	4/24	4.3	0.009
PR × SS × TR	4/24	8.2	0.000

In the ANOVA of the effort data, main effects due to Salary Increase, Time to Increase, Starting Salary, and Time Requirement were significant, as were the two-way interaction between Starting Salary and Time Requirement and the three-way interaction between Performance Requirement, Starting Salary, and Time Requirement. Plots of the cell means for the three-way interaction between Starting Salary, Time Requirement, and Performance Requirement are provided in Figure 2. The plots are not consistent with either the parallelism theorem or the linear fan theorem from functional measurement and information integration theory.

Regression Analyses

Two overall regression analyses were performed for both the satisfaction and the effort data, to measure the proportion of variance accounted for by differences among the subjects and the proportion of variance accounted for by each independent variable from the ANOVA.

Table 5 shows the results of regressing satisfaction ratings on the six dummy variables for subjects and of regressing effort ratings on the same variables. The multiple correlation between the subject variables and the satisfaction ratings is $R = .333$, which implies that 11.1% of the total variance in satisfaction ratings is due to differences among subjects. For the effort data, the results are similar: $R = .327$, and 10.8% of the total variance is due to differences among the subjects.

The hierarchical regression analyses showed that the individual variables accounted for most of the variance and the regression variables based on interaction terms contributed very little to the multiple correlation. The results for the satisfaction data are shown in Table 6. After entry of the six individual variables, the multiple correlation between these variables and ratings was $R = .77$, showing that these variables account for 59.6% of the total variance. After entry of the complete set of variables, $R = .78$, accounting for 61.4% of the total variance.

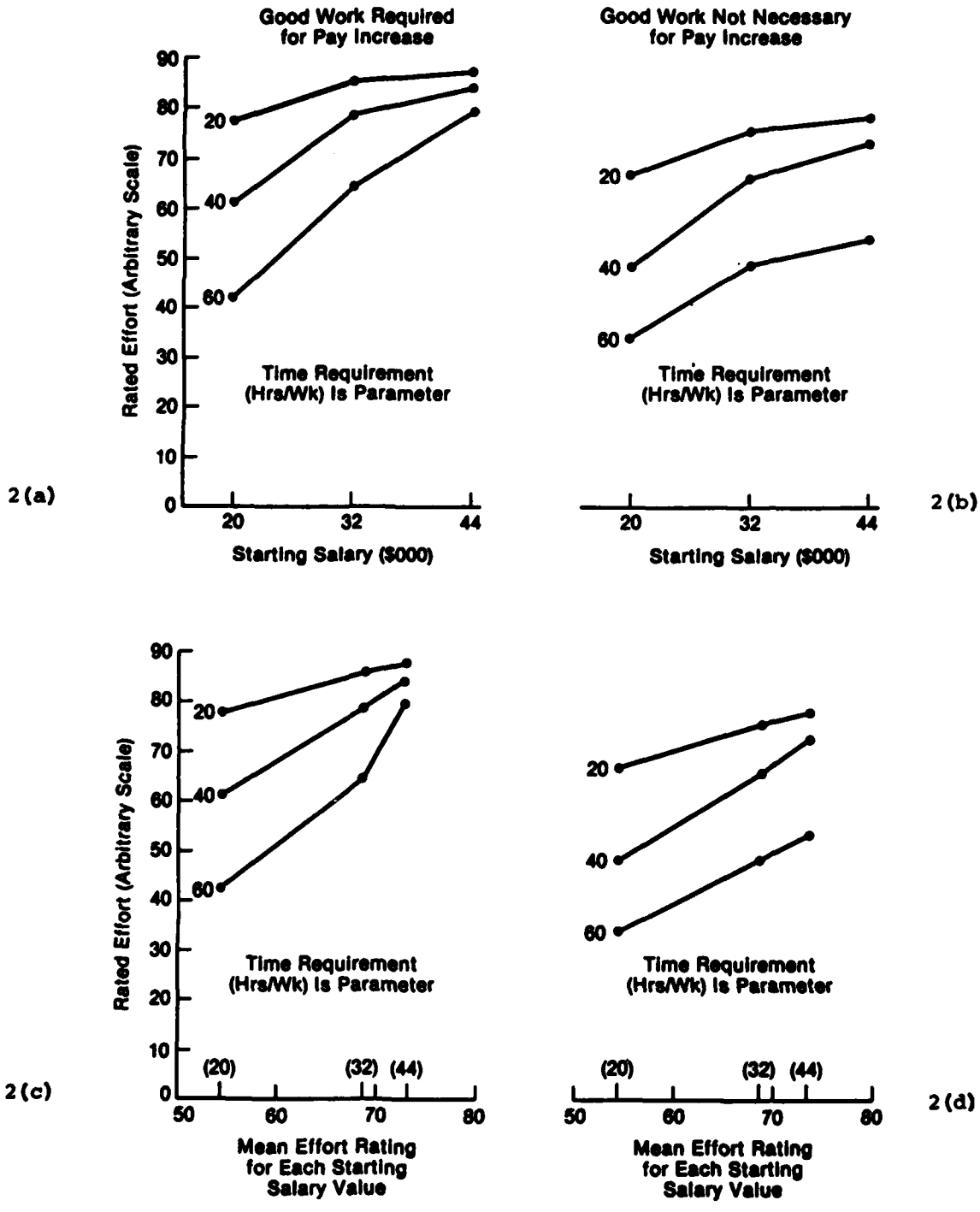

Figure 2. Graphical analysis of the three-way interaction between Starting Salary, Time Requirement, and Performance Requirement. Curves in (a) and (b) should be parallel if the integration rule is additive. In (c) and (d) the data are plotted as functions of the marginal means of the two-way data table. Curves (c) and (d) would be converging or diverging straight lines if the integration rule were multiplicative.

Table 5

Regression of Dummy Subject Variables on Ratings

	ANOVA	df	F
1. Effort ratings			
Multiple R = .327	Regression	6	30.22
R^2 = .108	Residual	1505	
2. Satisfaction			
Multiple R = .333	Regression	6	31.25
R^2 = .111	Residual	1505	

Table 6

Results of Hierarchical Regression of Full Set of Independent Variables Including Interaction Terms for Satisfaction Data

Factor	r^2
After entry of the simple variables	
Performance Requirement	.00430
Salary Increase	.00904
Time to Increase	.01010
Starting Salary	.22801
Time Requirement	.34444
Multiple R	.77195
R^2	.59590
After entry of all 63 variables	
Multiple R	.78379
R^2	.61433

Results from the hierarchical regression analysis for the effort data are shown in Table 7. After entry of the five individual variables, R = .68, implying that these variables account for 47% of the total variance. After entry of the full set of 63 variables, R = .71, implying that the complete set of independent variables accounts for 50% of the variance. Note that even the

statistically significant interaction terms accounted for very small proportions of total variance.

Table 7

Results of Hierarchical Regression of Full Set of Independent Variables Including Interaction Terms for Effort Data

Factor	r^2
After entry of the simple variables	
Performance Requirement	.05964
Salary Increase	.06553
Time to Increase	.03774
Starting Salary	.10399
Time Requirement	.20098
Multiple R	.68402
R^2	.46788
After entry of all 63 variables	
Multiple R	.70658
R^2	.49926

Analysis of the Individual Data

One of the most important features of the methodology used in information integration theory and functional measurement is its ability to examine data at the level of individual subjects. To evaluate the possibility that the individual subject data would provide interesting information about the algebraic rules followed in this information integration task, a five-way ANOVA and a hierarchical regression analysis were performed on the individual data for each of the seven subjects. The main results of these analyses are shown in Tables 8 and 9. For each subject, the effects that accounted for more than 1% of the total variance in the regression analysis are shown, along with the proportion of that subject's variance accounted for by the variable in the regression analysis. For individual subjects, just as in the overall analyses, higher order interaction terms accounted for very little of the total variance. Individual differences appear in two ways. First, the relative importance of each of the simple job factors, as measured by the proportion of variance accounted for, varied widely from subject to subject. Second, the presence of interaction effects distinguishes some subjects from others.

Table 8

Results of ANOVA and Regression Analysis of Individual Subject Satisfaction Data

Subject	Factor	Proportion of total variance
1	Salary Increase	.117
	Time Requirement	.705
2	Starting Salary	.357
	Time Requirement	.313
	SS × TR	.052
3	Starting Salary	.512
	Time Requirement	.272
	PR × TR	.015
4	Starting Salary	.189
	Time Requirement	.650
5	Starting Salary	.395
	Time Requirement	.460
6	Starting Salary	.125
	Time Requirement	.319
7	Salary Increase	.060
	Starting Salary	.422
	Time Requirement	.139
	PR × SS	.011
	SS × TR	.019

Table 9

Results of ANOVA and Regression Analysis of Individual Subject Effort Data

Subject	Factor	Proportion of total variance
1	Performance Requirement	.138
	Time to Increase	.017
	Starting Salary	.059
	Time Requirement	.330
	SI × TR	.023
2	Performance Requirement	.139
	Salary Increase	.108
	Time to Increase	.138
	Starting Salary	.128
	Time Requirement	.165
3	Starting Salary	.251
	Time Requirement	.129
4	Starting Salary	.082
	Time Requirement	.508
	SI × TR	.013
5	Performance Requirement	.165
	Starting Salary	.086
	Time Requirement	.211
	PR × SI × TI × SS × TR	.026
6	Starting Salary	.158
	Time Requirement	.363
	SS × TR	
7	Time to Increase	.132
	Starting Salary	.235
	Time Requirement	.134
	SS × TR	

DISCUSSION

The main purpose of the research reported here is to develop a practical method for studying the way people integrate information from descriptions of jobs and for using the results of responses to job information to predict the effects of changing job characteristics. The data presented are of secondary importance and are used here primarily to exemplify the method. For this reason, this discussion will focus on the method.

Reliability of Ratings

Data showed that the ratings were highly correlated, but that there were individual differences in reliability, which may have indicated that some subjects were more conscientious than others in performing the task. The fact that ratings were more reliable for satisfaction than for effort suggests that making judgments about satisfaction is easier than making judgments about level of work effort.

Effort and satisfaction ratings should be correlated to some extent since they are based on identical information. While differences in reliability for satisfaction and effort ratings imply that the two ratings were somewhat independent, the correlation between the two ratings was very high, suggesting that the format of the rating scales reduced the independence of the ratings. Research on this issue is currently being conducted.

Theories of Job Information Integration

With small exceptions to be noted later, these data are remarkably consistent with either an additive model or a constant weight averaging model of information integration. The satisfaction data produced no significant interaction terms in the ANOVA, and the effort ratings produced two significant interactions.

There are two possible explanations for the effort data, neither of which can be ruled out convincingly by the present data. First, subjects may have integration rules that are more complicated than adding or constant weight averaging for the variables concerned. Second, the experimental procedure may be such that the response scale is slightly nonlinear. The fact that the pattern of results for effort ratings is more complex than that for satisfaction suggests that there are genuine differences in the underlying integration rules. The fact that the interactions account for small proportions of variance in both overall analyses and individual analyses is also consistent with the existence of small nonlinearities in the response measure. Research is being conducted at the present time to provide definitive identification of the underlying integration rules.

While the data presented here do not allow definitive statements about the information integration process used by subjects in this task, the method used offers researchers a way to test a variety of mathematical descriptions of the ways people make judgments about jobs and work. Models from statistical decision theory, expectancy-value motivation theory, and economic demand theory can all be tested using these procedures.

Measurement and Prediction of Responses to Job Factors

The ANOVA results are the definitive goodness-of-fit tests for evaluating theoretical models and the measurement procedures derived from them. When suitably powerful experimental procedures and statistical analyses are used, even very slight deviations from a hypothetical model can be detected. In the present results, a number of such "small" effects appear. For theoretical and experimental purposes, these results are important, but the data indicate that

a very simple additive model can be used successfully for predictive purposes, even though it does not fit all the data as a description of the underlying integration process.

The regression analysis based on the independent variables in the job descriptions shows that substantial prediction can be achieved using a simple linear regression equation and ignoring interaction terms. The regression weights for predicting satisfaction and effort are shown in Tables 10 and 11. Tables 12 and 13 show the change in each variable that would result in the same increment in satisfaction and effort as an increase in Starting Salary of $10,000.

Table 10

Regression Weights for Satisfaction Data

Job factor	Regression weight (B)
Performance Requirement	4.94034
Salary Increase	.00162
Time to Increase	-.32146
Starting Salary	1.83504
Time Requirement	-1.35323
Intercept	77.85465

Table 11

Regression Weights for Effort Data

Job factor	Regression weight (B)
Performance Requirement	11.69233
Salary Increase	.00277
Time to Increase	-.39493
Starting Salary	.78791
Time Requirement	-.65721
Intercept	60.97659

Table 12

Change in Each Dependent Variable Required to Produce the Same Effect on Satisfaction as a $10,000 Increase in Starting Salary

Job factor	Increment
Starting Salary	$10,000
Salary Increase	$11,327
Time to Increase	-57 months
Time Requirement	-13.6 hrs./wk.

Note. Addition of a Performance Requirement for Salary Increase has the same effect on satisfaction as an increase in Starting Salary of $2,692.

Table 13

Change in Each Dependent Variable Required to Produce the Same Effect on Effort as a $10,000 Increase in Starting Salary

Job factor	Increment
Starting Salary	$10,000
Salary Increase	$2,844
Time to Increase	-20 months
Time Requirement	-12.0 hrs./wk.

Note. Addition of a Performance Requirement for Salary Increase has the same effect as an increase in Starting Salary of $14,837.

Interpretation of the numbers in Table 12 is as follows: With an average time to salary increase of 21 months, a potential increase of $11,327 has the same effect on rated satisfaction as an increase in starting salary of $10,000. With an average pay increase of $2,890, a delay of pay increase by 57 months has the same effect on satisfaction as a $10,000 reduction in starting salary. Interpretations of the other factors are similar. Note that potential salary increase and time to increase have more dramatic effects on the effort data than on the satisfaction data.

Individual Differences

The patterns of data for each subject differed in two ways. First, each subject assigned different weight to each variable as measured by the proportion of variance accounted for. Second, the different patterns of significant and nonsignificant variables suggest the possibility of differences in the algebraic rules used by subjects. The present data do not allow any definitive statement about this hypothesis, but it is possible that some subjects integrate information about jobs using simple additive rules, while others use more complicated averaging or multiplying rules to integrate certain variables. It is for this reason that Anderson's (1977) suggestion about analysis of individual subject data may be useful in the study of integration of job information.

CONCLUSION

In this research subjects were asked to evaluate jobs that vary along a number of dimensions, with stimulus jobs produced to fill a factorial experimental design, using a simple graphic rating scale. ANOVA and regression statistics were used to analyze the results. This method has three interesting results. First, it allows the investigator to test hypotheses about the algebraic rule the subjects are using to integrate the information about the jobs. Second, a simple linear regression equation derived from the data can predict responses to other job descriptions. Third, the same simple linear regression equation can be used to produce a scale of the value or importance of nonmonetary job factors in terms of dollars of starting salary. While the method needs methodological refinement, such as cross-validation of the regression equation, more careful examination of the curvilinear relationship between starting salary and satisfaction and effort, and validation against actual job behavior, such uses are clearly feasible.

The method is a little more difficult to use than more traditional questionnaire-based approaches to the study of job satisfaction and motivation. It requires a little more experimental care, and a little more diligence from the participants. It also yields a great deal more. Research is presently under way to develop experimental designs that will allow inclusion of more job factors while keeping experimental sessions to reasonable lengths.

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